Below Knee Intervention
How to Deal with Tibial and Peroneal Artery Disease

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ITALY
BTK Endovascular Interventions

Milano Experience (2000-2008)
Hub & Spoke Model

Diabetic Foot Clinic
- Abbiategrasso (20 Km)
- Milano (5 km)
- Sesto S. Giovanni (10 Km)

Diabetic Foot Clinic

Diabetologists
- General Practitioners
- Nefrologists
- Orthopedics
- Vascular Surgeons
- Podiatrists

Ospedale Maggiore Policlinico

Milano Experience (2000-2008)
BTK Endovascular Interventions
Milano Experience (2000-2008)

Procedural Success

<table>
<thead>
<tr>
<th>Year</th>
<th>Success (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2000</td>
<td>89</td>
</tr>
<tr>
<td>2001</td>
<td>91</td>
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<tr>
<td>2002</td>
<td>89</td>
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<tr>
<td>2003</td>
<td>92</td>
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<tr>
<td>2004</td>
<td>93</td>
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<tr>
<td>2005</td>
<td>95</td>
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<tr>
<td>2006</td>
<td>94</td>
</tr>
<tr>
<td>2007</td>
<td>93</td>
</tr>
<tr>
<td>2008</td>
<td>94</td>
</tr>
</tbody>
</table>
BTK Endovascular Interventions

Milano Experience (2000-2008)

Mean Age

Years

Mean Age

BTK Endovascular Interventions

Milano Experience (2000-2008)

End Stage Renal Disease

%
BTK Endovascular Interventions

Milano Experience (2000-2008)

Mean Length of Treated Vessels

Mean Length (mm)
### BtK Arteries Disease Pattern

#### Prevalence

<p>| | | |</p>
<table>
<thead>
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<tbody>
<tr>
<td></td>
<td>6%</td>
<td></td>
</tr>
<tr>
<td></td>
<td>68%</td>
<td></td>
</tr>
<tr>
<td></td>
<td>96%</td>
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</table>
BtK Arteries Disease Pattern

Localization & diffusion

<table>
<thead>
<tr>
<th>Number of Vessels</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 vessel</td>
<td>10%</td>
</tr>
<tr>
<td>2 vessel</td>
<td>20%</td>
</tr>
<tr>
<td>3 vessel</td>
<td>70%</td>
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BTK Endovascular Interventions
Milano Experience (2000-2008)

Mean Length of the Single Lesion

Mean Length (mm)

BTK Endovascular Interventions

Key Points

• Vascular approach
• “Coronary like” study
• Material improvement
• Availability of different techniques
BTK Endovascular Interventions
Milano Experience (2000 Vs 2008)

VASCULAR APPROACH

- Controlateral: 27% (2000), 7% (2008)
- Others: 0% (2000), 0% (2008)
<table>
<thead>
<tr>
<th>BTK Endovascular Interventions</th>
<th>Antegrade approach</th>
</tr>
</thead>
</table>
| **SFA selective injection**   | • high quality imaging  
                               | • less contrast dye (85 ml/procedure) |
| **Best endovascular device control** | • treatment of CTO   
                                       | • subintimal angioplasty  
                                       | • snaring of wires |
| **4 French introducer sheath** | • no closure device  
                                 | • less complications |
BTK Endovascular Interventions
Milano Experience (2000-2008)

Antegrade Approach:
% Vascular complications

YEAR

%
BTK Endovascular Interventions
Milano Experience (2000-2008)

Introducer dimensions and complications

- Surgical Therapy
- Medical Therapy

% Complications

P < 0.05
BTK Endovascular Interventions

Key Points

• Vascular approach
• “Coronary like” study
• Material improvement
• Availability of different techniques
“Coronary like” Study

Angiographic evaluation of the arteries of the limb should be done with the same approach of coronary arteries study that is the use of different views (AP, oblique, cranial, caudal projections)
BTK Endovascular Interventions
Milano Experience (2000-2008)

Key Points

- Vascular approach
- “Coronary like” study
- Material improvement
- Availability of different techniques
BTK Endovascular Interventions

New balloons

- Low profile balloon with high pushability and trackability to easy cross the lesion
- Vessel conformability
- Flexibility in small collateral branches
- Long balloons (8-21 cm) to reduce procedure times and dissection
- High pressure (13-20 atm)
- Long inflation time (3-5 min.)
Retrograde approach

Occlusion of posterior tibial artery
Proximal anterior tibial artery treatment

- Balloon 3.0 x 20 mm at 12 atm
Treatment of CTO of posterior tibial artery

Antegrade Approach

- 4F Berenstein catheter (J&J)
- 0.014” wire (PT2 Boston Scientific)
It is possible to reach our goal from this subintimal position by using the available material?
Retrograde trans-metatarsal approach

- Amphirion Deep 2.0 x 40 mm (Invatec)
- 0.014” wire (PT2, Boston Scientific)
Retrograde balloon dilatation
Antegrade balloon dilatation:
Amphirion Deep 2.5x150 mm
15 atm (Invatec)
BTK Endovascular Interventions

Key Points

- Vascular approach
- “Coronary like” study
- Material improvement
- Availability of different techniques
BTK Revascularization Techniques

1\textdegree\ approach = POBA

\textit{Endoluminal treatment failure}

Subintimal treatment
Subintimal Angioplasty

Indications:

• Predominantly Atheromatous disease
• Not much Ca++
• Long occlusions
• Good distal target vessels (SIA = Bypass)
Subintimal Angioplasty (Tibial)

THE FINER POINTS
- Keep the loop short to avoid perforation
- 0.035 wire/ 4-5F system for strength
- Wire may be in Half-Stiff or Stiff format
- New 1.5mm J wire very effective
SIA not applicable because:

- With Ca++, high resistance to progression
- Difficult / Impossible to re-enter
- Recoil is common
- Patient made worse due to damage to small collaterals
BTK revascularization techniques

1° approach = POBA

Subintimal treatment

Subintimal treatment failure

Retrograde approach
Retrograde (double) approach

- Proximal access in SFA (CFA)
- Distal access:
  - pedal artery → ATA
  - retromalleolar artery → PTA
- 20 gauge needle puncture (the radial needle)
- No introducer, wire + low profile OTW balloon (Amphirion Deep – Invatec)
- Snare kit to capture wire in SFA
Distal posterior tibial puncture:

- DSA imaging
- 22 gauge needle
- 0.014” wire (PT2 Boston Scientific)
Posterior tibial retrograde approach:

- No introducer sheath
- Amphirion Deep 2.0 x 40 mm (Invatec)
- 0.014” wire (PT2 Boston Scientific)
Final Result
BTK Stenting in the last 578 procedures
(1140 lesions)

<table>
<thead>
<tr>
<th>Stenting</th>
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<tr>
<td>51/57</td>
<td>89 %</td>
</tr>
<tr>
<td>205/407</td>
<td>50 %</td>
</tr>
<tr>
<td>88/676</td>
<td>15 %</td>
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</table>
Survival Rate at 2 Years

- Successful PTA: 95%
- Unsuccessful PTA: 43%

Ferraresi R, EJVES 2009;37:336-42
Limb Salvage at 2 Year

Successful PTA

95%

Unsuccessful PTA

57%

Ferraresi R, EJVES 2009;37:336-42
Conclusions

1. In patients with CLI the keys for a successful BTK endovascular procedure are the choice of vascular approach, the selection of materials and the knowledge of all the available techniques

2. Stenting (with dedicated BTK stents) should be considered only for bail-out situation

3. The clinical outcome depends on a proper infection treatment, but the success of the endovascular procedure is of paramount importance
The miracle of the Saved Foot

Vincenzo Foppa 1460  Sant’Eustorgio Church in Milan
Angiographic findings

397 Patients / 440 Limbs

- Diabetic patients
- Foot lesions: ulcer/necrosis/gangrene
- Absence of pedal pulses
- $\text{TcPO}_2 < 40 \text{ mmHg}$
Outcome of PTA of isolated BTK lesions in CLI

- Diabetic subjects with ischemic tissue lesions (Rutherford grade III, category 5-6)
- Absence of critical lesion (> 70% diameter stenosis or occlusion) in the OTK arteries
- BTK arteries critical lesions (> 70% of the vessel diameter stenosis in anterior tibial, posterior tibial, peroneal, pedal or plantar arteries)

Primary End-point:

- Survival rate and major amputation rate at 2 year

Ferraresi R, EJVES 2009;37:336-42
Antegrade femoral puncture

- Danger !!! retroperitoneal bleeding
- OK !!!
- Danger !!! groin & thigh hematoma

The right puncture site
Subintimal treatment in BTK

- In order to use subintimal approach in BTK vessels we need a good distal patent lumen
- 0.035” hydrophilic wire
- Attention to collateral vessels !!
- Subintimal space is larger than true lumen: oversize balloon (0.5 mm)
Retrograde approach for PTA
Treatment of CTO of Tibioperoneal trunk

Antegrade Approach

- 4F Berenstein catheter (J&J)
- 0.014” wire (PT2 Boston Scientific)